

# BREEDING HABITS AND ASSOCIATED PHENOMENA IN SOME INDIAN BATS

## Part V—*Pipistrellus Dormeri* (Dobson)—Vespertilionidae<sup>1</sup>

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*Pipistrellus dormeri* collected from Nanded, Maharashtra State, India has no restricted breeding season, but breeds all the year round. The females experience postpartum oestrus and there is a quick succession of pregnancies. Pregnancy may be unilateral or bilateral and not more than one embryo is carried in the uterine cornu during a given cycle. There is an uneven sex ratio with the females outnumbering the males in the adult stage although the sex ratio during juvenile life is balanced.

### INTRODUCTION

Detailed reviews of the literature on the breeding habits of bats have been given in earlier communications in this series of papers (Madhavan 1971; Gopalakrishna & Rao 1977). Among the Indian species of vespertilionids the details of the reproductive behaviour have been reported only in *Scotophilus temmincki*, *S. wroughtoni* (Gopalakrishna 1947, 1948, 1949) and *Pipistrellus ceylonicus chrysothrix* (Madhavan 1971, Gopalakrishna & Madhavan 1971). Although both these species have an annual reproductive cycle the exact breeding season is different. *Scotophilus temmincki* (Gopalakrishna 1947, 1948, 1949) comes to heat in the middle of March when copulation occurs, and this is immediately followed by pregnancy. The young are delivered towards the end of June or early in July. *Pipistrellus ceylonicus chrysothrix* (Madhavan 1971; Gopalakrishna & Madhavan 1971) breeds in the rainy season in and around Nanded in Maharashtra. This species undergoes copulation

during the first week of June and the inseminated spermatozoa, which are stored in the female genital tract, fertilize the ova released in the second week of the following July. Deliveries in the colony take place between the last week of August and the second week of September. The foregoing account and the observations on the biology of several Indian vespertilionids (Brosset 1962 a, b, c, 1963) reveal that there is no common breeding pattern even among Indian vespertilionids.

A detailed study of the breeding habits of *Pipistrellus dormeri* has been undertaken because this bat exhibits features not noticed in any Indian vespertilionid so far studied but resembles the Indian emballonurid bat, *Taphozous longimanus* (Gopalakrishna, 1954, 1955) in several respects.

### MATERIAL AND METHODS

The specimens of *Pipistrellus dormeri* were collected at random from old houses in and around Nanded, Maharashtra. The specimens were collected during the period between February 1965 and 30th May 1970 in such a manner that every calendar month is represented by one collection or more. Altogether 673 spe-

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cimens were studied for the present report. The body weights were taken with a spring balance and the weights of the sucklings attached to the teats of the mother and those of the young ones which had accidentally dropped from their mothers' breasts were taken with a chemical balance. Body measurements and the length of the testes were recorded. The characters of the external genitalia, the condition of the mammary teats in the females and the position of the testes and the condition of the penis in the males were also recorded. The genital organs and the accessory reproductive structures were dissected out and fixed in different fixatives. The tissues were processed in the usual manner and the sections were stained with Ehrlich's haematoxylin and eosin.

A detailed collection diary showing the description of each specimen was maintained. Table 1 gives the summary of the collection diary and Table 2 gives the monthwise collection of the specimens.

#### OBSERVATIONS AND DISCUSSION

##### 1. General remarks on *Pipistrellus dormeri*.

*Pipistrellus dormeri* is a small bat that roosts during the day time inside crevices in the wooden frames of doors, rafters in the ceiling or below the tiles of the roof of houses. The animal lies with its ventral surface applied to the object to which it clings either with head up or down. Each roost has about three to six specimens which remain deep inside the crevices and they can be evicted out of the crevices by fumigating the crevices with tobacco smoke. Normally the males come out first. This indicates that the males probably occupy the peripheral part of the roosts. The fur on the dorsal side of the body is light brown and that on the ventral side is white.

There is a white streak on each side on the dorsal surface at the flank between the patagium and the trunk.

The body weight of the adult male and that of the adult nonpregnant female ranges from 6.0 to 7.0 g; average length of the fore-arm 3.6 cm; wing-span 24.0 cm; and head length 1.7 cm. A single large incisor is present on either side of the upper jaw.

Although *Pipistrellus dormeri* often lives in association with other bats such as *Pipistrellus ceylonicus*, *Pipistrellus mimus mimus* and *Hipposideros fulvus fulvus* the different species remain in small isolated groups in the same house. The males and females live together throughout the year, there being no sexual segregation at any time. The newly born young ones are naked and its skin darkly pigmented.

##### 2. Breeding habits

A perusal of the collection diary and table 1 shows that pregnant females occur in all the months of the year. This leads to the conclusion that *Pipistrellus dormeri* does not have a sharply restricted breeding season but breeds throughout the year.

The adult females collected during any calendar month were at various stages of sexual activity, and the pregnant females collected during any month carried conceptuses at different stages of development as revealed by the differences in the size of the uterine swellings in different females.

Each female becomes pregnant more than once in an year and each female experiences quick succession of pregnancies as revealed by the fact that several females which were collected during different calendar months of the year were not only in lactation and carried young at the breast, but also showed pregnant uterine cornua on dissection.

Females in lactation were collected during all the months of the year except February

TABLE 1  
SUMMARY OF COLLECTION DIARY

Date	Male					Female							Grand Total		
	Immature		Adult	Total	Total	Immature			Nonpregnant		Pregnant			Lactating	Total
	Attached	Free				Attached	Free	Attached	Free	Right cornu	Left cornu	Both cornua			
	2	3	4	5	6	7	8	9	10	11	12	13		14	
1															
5-1-70	-	-	2	2	-	-	-	-	-	-	-	-	-	2	
6-1-69	1	2	5	8	-	-	3	1	1	-	-	2	7	15	
8-1-68	-	-	1	1	-	-	4	-	-	-	-	-	7	8	
8-1-70	-	-	1	1	-	-	4	-	1+1*	1	-	-	7	8	
15-1-68	-	-	1	1	-	-	-	-	-	-	-	-	-	1	
21-1-68	-	-	2	2	-	-	-	-	-	1	-	-	1	3	
24-1-69	-	-	1	1	-	-	3	-	-	-	2	-	5	6	
25-1-70	-	-	2	2	-	-	4	-	-	3	-	-	7	9	
28-1-68	-	-	3	3	-	-	-	1	2	4	-	-	7	10	
2-2-69	-	-	1	1	-	-	-	-	-	2	-	-	2	3	
2-2-70	-	-	3	3	-	-	1	1	-	-	3	-	5	8	
3-2-69	-	-	1	1	-	-	1	-	-	4	-	-	5	6	
6-2-65	-	-	-	-	-	-	-	-	-	1	-	-	1	1	
8-2-70	-	-	1	1	-	-	-	3	2	5	-	-	10	11	
11-2-68	-	-	3	3	-	-	-	2	3	1	-	-	6	9	
13-2-66	-	-	1	1	-	-	-	1	1	2	-	-	4	5	
15-2-69	-	-	1	1	-	-	1	-	1	7	-	-	8	9	
16-2-70	-	-	1	1	-	-	-	5	-	1	-	-	12	13	
17-2-68	-	-	-	-	-	-	2	-	-	1	-	-	3	3	
21-2-70	-	-	3	3	-	-	-	1	8	-	-	-	9	12	
28-2-69	-	-	4	4	-	-	-	-	7	1	-	-	8	12	
28-2-70	-	-	3	3	1	-	-	3	4	1	-	-	9	12	
2-3-68	-	-	1	1	-	-	1	2	5	-	-	-	8	9	
2-3-70	-	-	2	2	-	-	-	-	4	-	-	-	4	6	
7-3-69	-	-	1	1	-	-	-	-	-	-	-	-	-	1	
8-3-68	-	-	1	1	-	-	-	2	3	-	-	-	5	6	
9-3-70	-	-	1	1	-	-	-	-	-	-	-	-	-	1	
17-3-68	-	-	2	2	-	-	-	2	1	-	-	-	3	5	

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14
20-3-69				1	1	-	-	-	1	1	-	-	2	3
22-3-70				1	1	-	-	1	-	4	-	-	5	6
25-3-70		2		1	3	-	1	-	-	1+1*	-	3	6	9
27-3-68						1	-	-	11	-	-	1	13	13
27-3-69						1	-	1	3	-	-	2	7	7
29-3-68				1	1	1	-	-	-	-	1*	1	3	4
3-4-69				1	1	-	-	-	-	-	-	-	-	1
5-4-69				1	1	-	-	2	-	-	-	-	2	3
5-4-70			2	1	3	1	-	-	1	-	2	-	4	7
10-4-66				1	1	1	-	-	-	-	-	1	2	2
12-4-69				2	2	1	-	-	2	-	1	1	5	7
13-4-70			1	2	3	-	1	-	-	-	3	-	4	7
19-4-69				1	1	2	-	-	1	-	-	2	5	6
27-4-70			2	-	2	-	-	-	2	1	-	1	4	6
4-5-70		1		-	1	1	2	1	-	2	-	-	6	7
15-5-65		1		2	3	-	-	1	-	-	-	1	3	6
20-5-66				2	2	-	-	-	1	-	-	-	-	2
20-5-70			1	2	3	-	-	-	1	-	-	3	4	7
26-5-66				2	2	-	-	-	-	1	-	-	1	3
27-5-66				2	1	-	-	-	-	-	1*	-	1	2
30-5-70				3	3	-	-	1	-	-	-	-	1	4
2-6-69				1	1	-	-	3	-	-	-	-	3	4
16-6-68				-	-	-	-	1	-	-	1	-	2	2
17-6-68			1	3	4	-	-	-	-	1	-	-	1	5
22-6-68		3		4	7	1	-	-	2+3*	-	-	-	6	13
22-6-69				2	2	-	-	-	2	2	2	1	7	9
14-7-69				2	2	1	-	-	1	2	-	2	6	8
17-7-68			1	1	2	-	-	1	5+1*	-	-	-	7	9
23-7-67		1		2	2	1	1	-	2	2	-	2	6	8
27-7-69				2	2	-	-	-	-	1	1	-	3	5
28-7-68				3	3	-	-	-	-	-	-	-	1	4
30-7-65		1		-	1	-	-	-	-	1	-	-	3	4
2-8-68				-	-	-	-	-	-	1	-	-	1	1
3-8-69			1	1	2	-	-	1	1	4	-	1	7	9
6-8-69				1	1	1	-	-	1	1	1	1	5	6
11-8-69			1	1	2	-	-	-	1	4	-	-	4	6
14-8-65				-	-	-	-	-	-	1	-	-	1	1
19-8-69		2		1	3	1	-	-	-	-	1	3	5	8

1	2	3	4	5	6	7	8	9	10	11	12	13	14
24-8-69	-	-	-	-	-	-	-	1	4	-	-	5	5
2-9-69	-	2	1	3	-	-	-	-	4+1*	-	1	6	9
3-9-67	-	-	1	1	-	1	-	3	2	-	-	6	7
10-9-69	-	-	1	1	-	-	-	-	-	-	-	-	1
12-9-69	-	-	-	-	1	4	-	-	-	1*	1	7	7
15-9-68	-	2	1	3	1	3	1	-	3*	-	1	9	12
16-9-69	-	1	3	4	-	-	1	1*	1*	-	-	3	7
20-9-68	-	1	3	4	-	1	1	-	3*	-	2	7	11
21-9-69	1	2	3	6	-	1	3	2	-	3*	5	14	20
28-9-67	1	-	-	1	-	-	1	1	-	-	1	4	5
29-9-69	-	-	-	-	-	2	-	1+3*	-	-	1	7	7
5-10-69	1	2	1	4	-	-	-	1	2*	-	4	7	11
10-10-69	-	2	3	5	-	1	2	1+1*	-	1*	4	10	15
15-10-69	-	-	2	2	-	1	5	-	-	1+1*	-	8	10
28-10-69	-	-	2	2	-	-	3	-	-	-	1	4	6
7-11-65	-	-	1	1	-	-	-	-	-	-	-	-	1
13-11-68	-	-	1	1	-	-	6	-	-	-	-	7	8
13-11-69	-	-	2	2	-	1	1	-	-	1	1	3	5
16-11-67	-	-	-	-	-	-	3	1	-	2	-	6	6
17-11-68	-	-	1	1	-	-	2	-	-	-	-	2	3
20-11-68	-	-	2	2	-	2	2	-	-	2	-	6	8
22-11-69	-	-	1	1	-	3	-	-	1	4	-	8	9
23-11-68	-	-	1	1	-	1	3	-	-	-	1	5	6
29-11-69	-	-	2	2	-	-	5	-	-	2	-	7	9
4-12-68	-	-	1	1	-	-	1	-	-	-	-	1	2
11-12-69	-	-	3	3	-	1	-	-	-	3	-	4	7
12-12-68	-	-	1	1	-	1	6	-	-	-	-	7	8
17-12-67	-	1	2	3	-	-	2	-	-	5	1	8	11
18-12-68	-	-	1	1	-	-	4	-	-	-	-	4	5
19-12-69	-	-	2	2	-	-	3	-	-	1	-	4	6
21-12-68	-	-	1	1	-	-	6	-	-	-	1	7	8
25-12-69	-	-	5	5	-	-	2	-	-	-	-	2	7
26-12-68	-	-	1	1	-	-	5	-	-	-	-	5	6
29-12-67	-	-	1	1	-	-	2	1	1	3	-	7	8
29-12-69	-	-	3	3	-	-	5	-	-	-	1	6	9

\* Specimens marked with an asterisk were also in lactation.

when no females in lactation could be collected. However, this does not in any way violate the conclusion that females in lactation occur throughout the year since a suckling young which had become accidentally detached from the mother was obtained in February. Apparently it was an accident that female with sucklings were not collected in February. The percentage of pregnancies in only one uterine cornu is higher than those which carry pregnancy in both the cornua in all the months except January, November and December where the situation is reversed. The percentage of pregnant females in the total population of females was higher during the months of February, March, June, July and August than during the rest of the year. There is greater percentage of females in postpartum pregnancy during September than in any other month.

In all the cases of unilateral pregnancy the contralateral ovary and the uterine cornu presented a typically an oestrous condition.

The adult testis exhibited spermatogenetic activity during the entire year.

Most of the bats, both tropical and temperate species, have a strict reproductive periodicity and breed in a sharply defined season (Baker & Bird 1936; Wimsatt 1942, 1944; Gopalakrishna 1947, 1948, 1949; Ramaswamy 1961; Madhavan 1971). Very few species have been known to breed more than once a year (Matthews 1941; Gopalakrishna 1964; Gopalakrishna & Chaudhary 1977; Gopalakrishna *et al.* 1975). Unrestricted continuous breeding throughout the year has been reported to occur in *Desmodus rotundus murinus* (Wimsatt & Trapido 1952) and *Taphozous longimanus* (Gopalakrishna 1954, 1955). *Pipistrellus dormeri* is unlike all Indian vespertilionids so far studied but resembles the Indian emballonurid bat *Taphozous longimanus*

in having an unrestricted breeding season, and in experiencing quick succession of pregnancies with postpartum oestrus.

TABLE 2  
MONTHWISE COLLECTION OF SPECIMENS

Month	Male	Female	Total
January	21	41	62
February	22	82	104
March	14	56	70
April	13	26	39
May	15	16	31
June	14	19	33
July	12	26	38
August	8	28	36
September	23	63	86
October	13	29	42
November	11	44	55
December	22	55	77

### 3. Sex ratio

Table 2 reveals that in a total of 673 specimens collected at random for a period of over five years 485 were females and 188 males giving a sex ratio of approximately 388 males for one thousand females. It is significant that among the 32 suckling young attached to mother's teats there were 17 females and 15 males giving nearly even sex ratio during the early juvenile stage. Evidently, there appears to be a preferential mortality of the males as the young ones reach the adult stage resulting in the unbalanced adult sex ratio in this species. An uneven sex ratio with females predominating the males has been reported in several species of Indian bats (Abdulali 1949; Gopalakrishna 1947, 1945; Ramaswamy 1961; Brosset 1962 a, b, c; 1963; Madhavan 1971; Gopalakrishna & Madhavan 1970; Gopalakrishna & Chaudhary 1977; Gopalakrishna & Rao 1977; Gopalakrishna & Madhavan 1977;

Madhavan *et al.* 1978). *Taphozous melanopogon* (Abdulali 1949) appears to be the only Indian Chiroptera in which there appears to be a predominance of males.

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